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Aspects of geographic intelligence in action.

LANDSCAPE ANALYSIS

Arthur R. Hall

In the highlands of North Vietnam the road south to Mu Gia Pass threads its way upstream along a narrow, steep-sided valley. To the left rise dog-toothed limestone peaks, to the right is a flat-topped plateau. Dense tropical rain forest covers the entire area, almost frustrating aerial observation. The road is carved out of the steep hillside, for in most places there is not enough room for both road and stream in the constricted bottom of the ravine. At the pass itself there is (or was) a North Vietnamese army barracks. Beyond the crest of the pass the road descends into Laos and branches eventually into several alternate roads that run southward through the Laos panhandle, where tracks and trails lead back east into Vietnam.

This complex of roads, part of the so-called Ho Chi Minh Trail, has been a principal supply route for the Communist forces in South Vietnam. In early 1966 its most vulnerable section was the stretch of single road through this narrow valley, for at that time there was no feasible alternative nearby. Bombs dropped accurately in the defile could create landslides, blocking the road. Bombs had been dumped on the road network south of the pass but had not impeded the traffic to any significant extent. In February 1966 a geographic intelligence officer wrote a report on the vulnerability of the valley road to Mu Gia, and a month later, during the briefing of a policy officer, he pointed it out again. Soon thereafter the road was bombed and the Communists were forced to divert considerable manpower to reopen it. The bombing may or may not have been the result of this particular intelligence tip, but the sequence does illustrate the work of the intelligence geographer.

Problems and Products

Geographic intelligence, as practiced in CIA, is concerned with analyzing the distribution of things on the earth's surface as they relate to the formulation and execution of U.S. policy. The surface in question, the landscape, is in reality a zone extending upward from

the actual land or water surface far enough to include the factors of weather and climate that influence man's activities and extending also below the surface as far as man's activities extend. The objects of interest in the landscape may be physical, biological, or cultural, but intelligence analysis of the landscape would be pointless if man himself were not the most important object. The landscape elements chosen for analysis in any particular case are those bearing on the intelligence problem at hand. Our Vietnam specialist knew about the physical landscape along the western border and he knew about the cultural features, the roads and the truck traffic passing over them. Of more importance, he analyzed them in the light of the operational problem: "Here to the north of Mu Gia Pass is the best choke point for interrupting the traffic."

The end product of the geographic analysis is normally a written text, perhaps accompanied by maps that illustrate or elaborate upon the text. Or the map may itself be the end product—a landscape description in representational form, wherein the analyst's skill is reflected in the selection of things to be represented, the proper location of these things, and the relative emphasis given each element within the whole. When foreign maps are used as sources of information the analyst may have to acquire some special knowledge of the mathematical and cartographic techniques used in preparing them; thus geodesy, gravimetry, and mapping as practiced in foreign countries fall within the purview of geographic intelligence. Since the landscape in one region of the earth varies from that in others, most intelligence geographers sooner or later become regional specialists.

The problems presented to the intelligence geographer fall into three broad categories. The first is characterized by questions of what one can do or see in a given landscape: problems of penetrating into, living in, or retreating from the region; and the identification of intelligence targets. The second category embraces political issues in a landscape setting: questions of national sovereignty and international boundaries; national or tribal loyalties of populations; identification, control, or use of natural resources; the potential of a region as related to political choices; and the intended use of a region by some particular group. The intelligence geographer's work in the first category constitutes, in general, a service to operations and in the second, in general, a service to policy formulation, although this distinction is not always clear-cut. The third category is that of cartographic problems: the correct identification, classification, and location of objects

and the preparation of maps as end products; and these maps may serve either operational or policy support purposes.

Operational Support: By Region

Support for operations may take the form of general descriptive studies for entire countries or large regions, or it may consist of detailed studies of small areas or selected landscape elements. Perhaps the best-known general descriptive studies covering entire countries are the geographic sections of the National Intelligence Surveys. The purpose of these is to evaluate the landscape from the standpoint of conventional military operations. Several other series of country or regional studies evaluate it for purposes of unconventional warfare, paramilitary operations, and clandestine operations.

During a quarter-century of war, cold war, and counterinsurgency it has been necessary to view the landscape of a fair portion of the world from the standpoint of the downed airman or the covert agent. These men need to know how to travel cross-country on foot in unfriendly territory, living out-of-doors if necessary, and avoiding or limiting any contact with the population. They need to know the answers to such questions as:

> What is the best route on foot through the mountains? Where are the lowlands too boggy to travel? What plant and animal life will furnish subsistence? What plants are poisonous, what animals dangerous? How deep is the snow, and how long does it cover the ground? What populated places should be avoided? What population groups are likely to be friendly to the illegal traveller? How can a man dress and act to be inconspicuous in a crowd? What isolated hill areas or deep forests should be chosen for hiding out? How efficient are the security forces in the area?

A series of country or regional Evasion Geographies was produced by CIA geographers in the 1950's to provide basic information of this type for air crews. This early series has been updated or supplemented in recent years by a new series of Escape and Survival reports designed for pre-mission briefing of either air crews or surface infiltrators.

Another series of country studies in which geographers have been heavily involved, Handbooks for Special Operations, treat elements of the landscape and related factors to be considered in planning and

appraising the feasibility of counterinsurgency, civic action, and similar operations, primarily in the underdeveloped countries. A joint product of several CIA components, each study treats in considerable detail the following subjects: physical geography; population, including ethnic and tribal groups; sociological factors such as housing, education, and health; politics and government; economy; transportation and telecommunications; possible operational targets; security forces; and survival factors.

Close-Ups

In contrast to the broad, sweeping view of the landscape in these studies is the close-up picture of selected areas often required in support of clandestine operations. Those planning the infiltration or exfiltration of agents have needed studies of routes for covert cross-country movement to a coast or to a selected point on a border. In the earlier years of the Iron Curtain, border-crossing studies were prepared that described the fences, watchtowers, and border security forces as well as the terrain, land use, and settlement patterns in boundary areas of East European countries. Support to paramilitary operations has included the description of transportation or industrial targets vulnerable to sabotage and the selection of drop zones, hide-out areas, and routes by which a team could reach the targets.

The intelligence geographer is often required to provide an area description in support of an intelligence collection effort against a particular target. Typically the target is a military/industrial complex in an urban area. An analysis must be made of the urban area as a whole, its size and function as a trade, transportation, and industrial center, as well as of the target complex proper—its product or function, its over-all importance in the urban scene, its physical location, and the names of the streets leading to it. Information on travel by bus, train, or taxi—route numbers, times of arrival and departure, stopping points, and fares—is given. Observation points from which the target installation may be viewed are usually designated. Security measures around the target are indicated. Quite often the study also includes an inventory of other points of operational interest in the city or surrounding countryside—police stations, army barracks, railroad stations, government or party headquarters, hotels, cafés, public monuments, and tourist attractions. In short, the study constitutes a Michelin guide for the gatherer of intelligence. If the gatherer is an electronic device instead of a man, its case officer will need information on the environment in which it is to operate, including such factors

as climate, ocean currents, high points and depressions on the land surface, and the rock structure of the site.

Identifying Targets

The geographic intelligence officer is often called upon for assistance in determining the identity or location of intelligence targets. Sometimes it may be a question of predicting the location of an installation in advance of its construction, as it was with the Soviet and Chinese Communist missile test sites. When the Soviet Union embarked on its ICBM and IRBM development programs in the mid-1950's, the need to locate the test sites and ranges became urgent. By applying assumed criteria for site selection the positions of future sites were predicted with reasonable accuracy.

In 1955, when Kapustin Yar was the only identified missile test site, a preliminary geographic report suggested three other potential sites and ranges. A more elaborate study was prepared in 1957, using criteria for selection laid down by the Guided Missile Intelligence Committee. GMIC[1] specified that: ICBM test ranges would have to be 3,000 to 5,500 nautical miles in length and IBRM ranges from 800 to 1,600 miles; the hazard to population would be high within a radius of 25 miles of the launch site and within 125 miles of the impact area; terrain flat enough for an airfield and monitoring instruments at each end of the range would be necessary; the range head must be near a railroad and accessible to shipments of missiles, component parts, and fuel supplies; to avoid foreign detection the sites would probably have to be 500 miles (later changed to 400 miles) from unfriendly territory; a water supply sufficient for 2,000 to 10,000 persons employed at the range head would be necessary; and severe climatic extremes would have to be avoided. Using these criteria, the analysts selected four possible ICBM launch areas in addition to Kapustin Yar, two of which proved to be reasonably close to locations later identified as ICBM test grounds. They also suggested the possibility of an IRBM range extending southeast from Kapustin Yar to the vicinity of the Chinese border; this had the orientation ultimately confirmed in the somewhat shorter Kapustin Yar—Sary Shagan ranges.

In selecting possible missile test sites in China, in 1958, it was assumed that the Chinese Communists would not be capable of producing an ICBM in the near future and would concentrate on missiles in the short-, medium-, and intermediate-range categories.

[1] Later, with the inclusion of "astronautics" in its charter, to become GMAIC.

Otherwise the criteria for selection were much the same as in the USSR. The China report limited the area of probable missile development to the arid, sparsely populated zone south of the Mongolia-China border, extending from the eastern edge of Inner Mongolia westward to the USSR-China border. Within this zone 15 possible test sites and ranges were selected, six of which were judged suitable only for missiles of no more than 400-mile range. The Chinese Communist missile program is still in the early stages of development, but the location of the one test site thus far identified—at Shuang-ch'eng-tzu—was predicted with almost pinpoint accuracy in the 1958 report.

Target identification and location of a different type was required during the Cuban missile crisis in 1962. Once the Soviet missiles in Cuba had been identified by air photography and collateral information, the prospect arose that missiles and other hardware might be hidden from observation in some of the island's numerous caves. CIA geographers identified and inventoried about 500 caves of such potential use and distributed a file of data cards on them to the intelligence community.

Policy Support: Peoples and Boundaries

The subject matter of landscape analyses done in support of policy formulation is almost as varied as the problems requiring U.S. policy decisions. Some of the most long-standing and recurrent themes are those concerning boundaries and national loyalties. U.S. government interest in these matters dates from the foundation of the republic. Our early concern with determining the boundaries of our own country was followed by interest in helping solve Latin American boundary disputes. During World War I the group of scholars known as the Inquiry studied ethnic and nationality distributions in Europe preparatory to fixing new boundaries in the postwar settlements.[2] Similar studies were made by geographers and others in the State Department for the treaties following World War II. In the postwar period the United States has of necessity been concerned with some of the boundary disputes inherited by newly independent states and with the tribal, linguistic, and religious diversities that cause internal strains

[2] Set up in late 1917 on the initiative of Colonel Edward M. House, this group worked until the end of 1918 at the American Geographical Society in New York. AGS President Isaiah Bowman, who later became president of the Johns Hopkins University, was its Executive Secretary. Its principal members went on to serve as advisors to the U.S. delegation at the Paris peace conference.

in the underdeveloped countries. Even in Eastern Europe, where boundary disputes are quiescent, resurgent nationalism has again brought the problem of minorities to the fore.

The intelligence geographer's contribution to the illumination of ethnic problems is illustrated by the case of Cyprus, where Greeks and Turks until recent years lived intermingled in a fairly uniform three-to-one proportion over most parts of the island. When the tension between the two ethnic groups erupted in bloodshed in late 1963 and U.S. mediators were trying to bring about a settlement, intelligence geographers were asked to evaluate several proposals. Alternate partition schemes were considered from the standpoint of how much of the population would have to be relocated, the amount and quality of agricultural land that would have to be exchanged, and the possibility of an equitable distribution of mineral and water resources. Proposals that Greece annex Cyprus and cede to Turkey portions of Western Thrace or some of the Aegean Islands were also evaluated. The still unsettled conflict has brought about a higher concentration of the Turkish Cypriots in several places on the island.

The need for information on the high, rugged border area in dispute between India and Communist China was the occasion for a series of analytical reports in 1954, 1959, and 1962. This is one of the few remaining border regions of the world where over extended areas no boundary acceptable to both parties concerned has ever been defined by treaty and demarcated on the ground. The geographic reports described the physical character of the area, the inhabitants, transportation, military dispositions, and the overlapping claims of the two contestants. They pointed up the lack of a clear-cut case for either party in most of the disputes.

U.S. success in working with the Meo tribes of Laos in counter-insurgency operations a few years ago stimulated interest in the possibility of making similar use of minority groups elsewhere. A requirement was laid on the geographers for a survey of those parts of the world where tribes with paramilitary potential might be found. After a general survey, studies on various tribal groups in Southeast Asia and Iran were undertaken in greater depth. Information was supplied on the culture and economy of each tribe, the terrain of its home base and areas of migration, its power structure and the relations among its subgroups, its relations with the central government, and its potential as an ally or enemy.

A somewhat different type of study of a local population, undertaken to help determine the advisability of a special intelligence collection

activity, was a collation of data on guerrilla activity and Communist zones of influence in Colombia. These zones are generally in the wilder, more inaccessible parts of the country, where the population is poverty-stricken and dependent on a subsistence agriculture. The report detailed conditions and current guerrilla activities in the different areas.

Intelligence geographers have on a few occasions been asked to evaluate areas proposed for relocation of refugees. After the flight of anti-Castro Cubans to Florida there was a proposal that some of them be resettled in the Bahama Islands. The requested geographic feasibility study painted a gloomy picture of the possibilities: the Bahamian economy could not absorb a significant number of refugees, the cultural differences between Cubans and Bahamians would make integration difficult, Bahamian labor unions would object to the competition, the existing racial differences in the Bahamas would be exacerbated. The resettlement idea was soon dropped.

International rivalry over utilization of a natural resource is occasionally the subject of analysis of policy purposes. One such report reviewed the conflicting plans of Israel, Jordan, and Syria for using the waters of the Jordan River.

An Eye on the Soviets

The developing Antarctic landscape has been watched continuously for over a decade because of uncertainty about the ultimate intentions of the Soviet Union in the region. U.S. and other Western officials interested in Antarctica were concerned in the 1950's lest the USSR advance a claim to sovereignty on the continent and establish a military presence there. In February 1957 an intelligence geographer, reviewing the establishment of Soviet stations in Antarctica and Soviet plans to participate in the International Geophysical Year, came to the conclusion that the USSR's immediate intentions were more scientific than military, although the scientific findings could eventually improve Soviet military capabilities in Antarctica, and that the Soviets would probably exploit their activities to demand a voice in any settlement of territorial claims. He correctly forecast that they would continue and expand their efforts after the termination of the IGY in 1958, and he advocated an exchange of U.S. and Soviet scientific observers at their respective stations on the continent to forestall any attempts by the USSR to conceal its activities or findings.

This idea of mutual inspection was embodied in the twelve-nation Antarctic Treaty of 1959, which placed the question of territorial claims

in abeyance and emphasized scientific endeavor. It provided for the exchange of observers among the stations of all the participating countries. Since the treaty came into force, geographic analysis has continued to follow Soviet activities as revealed by the U.S. observers and other sources and to suggest further objectives of the U.S. inspection program. Continued monitoring of the Soviet scientific program in Antarctica should shed light on Soviet future intentions, especially on the sensitive question of mineral exploitation, and provide a yardstick for measuring the USSR's compliance with its treaty obligation to share its findings with the world scientific community.

Soviet compliance with treaty obligations comes into question, of course, in regard to other treaties or proposed treaties, for example the proposed ban on underground nuclear testing. If a treaty prohibiting such testing is ever concluded, or even in the absence of such a treaty, it becomes of importance to inquire which parts of the USSR might be used for clandestine underground tests. To assist this inquiry an analysis was made of the geographic conditions affecting underground testing. It was pointed out that along the mountain rim bordering the country on the southwest and south there are salt deposits, caves, and deep mines in a zone of high seismic activity. Large underground cavities are therefore located or could be constructed here for nuclear explosions that could be passed off as natural seismic disturbances.

Another problem, that of air access to West Berlin, became acute in 1962 when Soviet planes began to harass Berlin-bound Western aircraft. It appeared that the Russians were attempting to whittle away Western rights in the air corridors over East Germany and were laying the groundwork for giving the East Germans control of the traffic. A geographic memorandum produced at the request of the interagency Berlin Task Force reviewed the legal and historical basis for Western rights to air access and discussed the means available to the Soviets and East Germans to interfere with the traffic. A later memorandum presented the same type of information for rail, highway, and canal access routes.

The Intelligence Map

For areas as thoroughly closed to Western intelligence as the interior of the USSR and Communist China, the analyst of the landscape makes a major contribution by simply giving the correct identity of objects and their location in relation to other objects. This is the purpose of the map program producing the Special Intelligence Graphic (AMS Map Series 1505). Undertaken jointly by CIA and the Defense De-

partment, the program is designed to produce up-to-date detailed maps that summarize available information on objects of military and intelligence significance. The sheets of the overall series are at the scale 1:250,000, but larger-scale sheets are produced for areas of special interest. Over 20 percent of the USSR is covered at present, along with small portions of China. Complete coverage of the two countries by 1971 is planned. The intelligence targets covered in the Soviet Union to date include ICBM facilities, space probe activities, surface-to-air missile launch complexes, urban-industrial complexes, naval facilities, nuclear energy complexes, and biological-chemical warfare test areas.

Source Problems

Anyone who undertakes to write about a landscape should ideally have had some on-the-spot experience with it, but this ideal is not always attainable. Large areas of the world, including countries that are of prime U.S. intelligence interest, are closed to the intelligence geographer. It would be as much a rarity for a U.S. geographic intelligence analyst to visit Kapustin Yar or Magadan as for a U.S. current intelligence analyst to interview Premier Kosygin. If his country of prime interest is not a denied area, the intelligence geographer may have lived or travelled in it before joining the intelligence fraternity, or he may make short area familiarization trips on the job, or he may spend some time in areas analogous to denied areas (the tundra of the Canadian Northwest bears a family resemblance to the tundra of Siberia). These experiences are of course quite useful. One intelligence geographer, for instance, travelled along the back roads of the southern Sudan near the Congo border during an area familiarization trip, taking many pictures and making detailed notes. Later, when arms were being supplied to warring factions in the Congo by way of the Sudan, the information he had acquired became highly pertinent for finished intelligence production. By and large, however, the intelligence geographer's job has to be done at a desk some thousands of miles from the area about which he presumes to be an expert.

The indirect sources of information available to him are nevertheless increasing in volume and to some extent improving in quality. In addition to classified raw intelligence reports, unclassified printed material is growing in quantity even for the closed areas. Aerial photography, which serves to a degree as a substitute for and an extension of on-the-ground observation, has always been relied upon

heavily. In the near future a new group of techniques for remote sensing of the environment may become important for geographic intelligence. Airborne infrared imagery is already proving its worth as a supplement to aerial photography, enabling the analyst to detect nighttime, and some invisible daytime, phenomena on the surface.[3] Devices for measuring radiation in yet other portions of the spectrum, as in the ultraviolet and the radar bands, are also being developed. Although of increasing value for the earth sciences, including geography, these techniques need further testing and critical examination before their value for intelligence is assessed.

The increasing mass of data becoming available through old and new techniques may turn out to be a curse rather than a blessing unless it can be properly manipulated and analyzed. The problem of orderly storage and retrieval of the incoming information has yet to be solved. For the increasingly refined photography and for the products of remote sensing, moreover, correct models of "ground truth" will have to be devised before interpretations can be made with confidence. Sophisticated techniques and source materials may aid in interpretation, but in the future, as in the past, the chief reliance will have to be placed on the talent, training, experience, and even intuition of the individual geographic intelligence officer for a correct understanding of the landscape.

From the foregoing it should be evident that the analyst of the landscape does not deal with a set of intelligence problems exclusively his own. He looks at many of the same problems that confront the case officer, the analyst of current events, the economic analyst, the national estimator, or the scientific/technical analyst, but he looks at them from a different viewpoint. If any essential elements of the problem relate to the distribution of things on the earth, here is grist for the intelligence geographer although other analysts may be dealing with other aspects of the problem. He relies heavily on graphic materials, but a particular set of tools or a particular set of techniques is not his hallmark. The earth-related view is his unique contribution to intelligence analysis.

[3] See the second article in this issue.